Issue 40
October 2021

Utah Valley Amateur Radio Club

The UVARC Shack

Back to being ourselves, in-person

As in-person meetings resume, we're just excited to be back together. Left-to-right, top-to-bottom: Harry AA1HE, Chad WE7CB, Wendy KW3NDY, Jill KJ7EFA (and husband Dave), Carl WE7OMG.

In this issue of the *UVARC Shack*

Terrific August club meeting featuring Ralph K7RLN, then our annual election in September.

Silent Key for WA7GTU. *My Shack* spotlights KJ7SNE. *Amateurs in Action* from Canada. *Brass Tacks* on proper grounding.

Dear Annette answers whether coax loss depends on SWR, and another about UHF max power. *Hot Tips* on Anderson Powerpoles. *DIY* for a 40/80 NVIS antenna. *The Amateur in You* on Field Day knots and feed line reflections.

Please send your ideas, stories, questions, gripes, and photos to ***uvarcshack@gmail.com***

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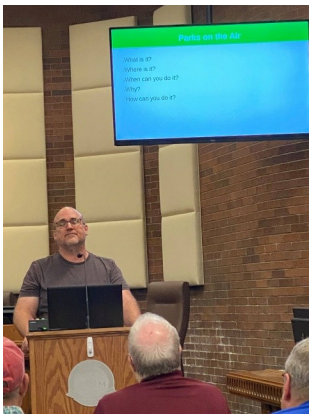
Club meetings

Recap

August 2021 club meeting – POTA



Ralph Nunn K7RLN explained POTA – Parks on the Air, a program in which a person can "activate" an approved park by setting up and transmitting from the park location, while getting others to respond. Ralph is one of the primary go-to hams for POTA and SOTA (Summits on the Air), and has activated numerous parks locally and while traveling. Thanks to Ralph for this fun discussion and presentation, and to Joe for the photos.

It was also our pleasure to spotlight the Draper Ham Radio Association by having their president, Eric Hansen N9ERC, tell us about their club and what kinds of activities they live for. Sorry, no recording of this meeting is available.

September 2021 club meeting – Election night

We held our elections in the September meeting like usual, and all five of the current Presidency were voted back into office. Thanks to Alma, our official electioneer, for running the show once again. The good news was that, during the vote-counting, we actually had time for a fun little demonstration by Noji on proper grounding. He brought a mock-up visual aid of an entire station ground, from shack ground plate to ground rod, and all the way up to the rooftop antenna. He details this "contraption" in ***Brass Tacks*** of this issue of the newsletter. You can see the recording of the meeting here.

By the way, many of our past meetings are recorded and posted on the club YouTube channel.

Silent Key

Memorial for a ham who has passed on

Don Blanchard, WA7GTU

On Saturday 04 September 2021, friend, elmer, and teacher Don Blanchard passed away at his home in Cedar City.

Don's many service achievements include

- Idaho National Guard
- EdD from Arizona State University
- Teacher of the Year at SUU
- Department Chair at SUU
- First SCUBA instructor at SUU
- Iron County Emergency Coordinator
- CERT certification
- Cedar City Radio Control Club president
- Cedar Valley Lions Club president
- Iron County Merit Commission
- LDS mission to Northern California
- LDS High Councilor
- LDS Temple Worker
- Volunteer Ski Patrol at Brianhead
- Silver Beaver in Scouting
- Second Miler Award in Scouting
- Wood Badge in Scouting

The following is an excerpt from his obituary:

Don's first love was amateur radio. He's been known by his call sign WA7GTU for over 50 years, and remained an active ham operator until days before his death. Don was instrumental in building, installing, and maintaining a network of repeaters now known as the Intermountain Intertie System, comprised of 23 continuously linked repeaters in five states. Don's was a friendly and familiar voice on the airwaves, especially on the Beehive Utah Net, where he often served as net control. He served as Vice President of the Utah VHF Society for 22 years and obtained non-profit status for the club.

Don is survived by his wife Linda, his children, and many grandchildren. He has always been a kind, helpful, and thoughtful elmer to many people.

73, Don.

My Shack

Highlighting the shack (ham equipment and room) of a member, to give others an idea of the possibilities that might work for them

Shawn Hatfield, KJ7SNE

As a youth of 16, Shawn remembers spending some quality time on his CB radio, at one making a contact clear across the country on only 4 watts. This, combined with a high school class that sparked a keen interest in electronics, laid the background of Shawn's road to amateur radio.

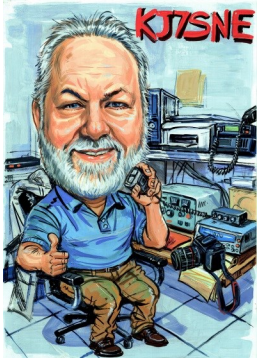
At the prodding of two good friends, Jon Babb KJØNAB and Roy "Saturday Night Live" Deeben KJ7SNL, Shawn studied and easily obtained his Technician license while a teacher at Payson Junior High. He never got a radio until a couple of weeks after he had his ticket, a Baofeng UV-9R. Today, he's added a Yaesu VX-6R to his HT arsenal.

Shawn uses a Yaesu FT-991A as his HF work horse, but that doubles as his home base VHF/UHF radio as well, since that model is an all-band radio. He also has a TYT TH-9800 he installed in his vehicle for mobile VHF/UHF.

For his antennas, Shawn uses a hy-gain AV-640 Patriot for HF and Diamond X510HDM for his base VHF/UHF communication. From his QRZ page:

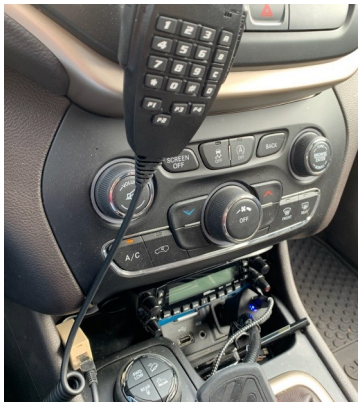
I have recently retired from many years of teaching science to junior high students. I'm very new with ham radio, getting my Technician license in October 2020, General two weeks later, then my Extra in November 2020.

I became a VE (volunteer examiner) for W5YI-VEC, and it has been very exciting watching people get their ham radio licenses. The hobbies I enjoy include photography, traveling, karate, camping, hiking, ham radio, and shooting, to name a few.



Shawn enjoys DXing, checking into the UVARC New Ham Net each Thursday, participating in the Eagle Mountain Emergency Net each Sunday, and is seriously looking into being involved with UCARES. He's been an active VE, an indispensable service.

— 73 from KJ7SNE



Amateurs in Action

Recounts of ham radio operators who have used their time and skills to help others in a time of need

Preparing for Field Day with an actual emergency

By Wednesday 19 June 2013, it had already been raining hard in an around Calgary, Canmore, and High River, Alberta, and forecasters were calling for at least four more inches in the next 36 hours. Scott VE6OBL and Vince VE6LK had been training prospective Field Day participants on procedures that day, and planning everything it takes for a successful event.

It took a village, L to R: Vince VE6LK, Tammy VA6TSS, Dann VE6TD, and Ian VA6IAB

The next morning, the Trans-Canada Highway was closed in Canmore, having been washed out by Cougar Creek. Landslides and flooding were reported imminent for Calgary and High Water. By Thursday afternoon, the Province of Alberta had asked the ARES teams to activate the POC (Provincial Operations Centre) in Edmonton, and soon Curtis VE6AEW had all the repeaters in southern Alberta linked, to provide a communication net for the effort soon to follow. By mid-afternoon, the POC had lost all cell and other contact with the High Water EOC, and Dann VE6TD and Ian VA6IAB set up an amateur network at the High River EOC, and re-established contact with the POC through the linked repeaters.

Much of the cellular, landline, electric power, and other services between Canmore and High River had stopped working, and the town of High River and much of Calgary were given evacuation orders. Due to the rising waters, the High River EOC had to be moved out-of-town, ironically near the site where the Foothills Amateur Radio Society had been planning to set up their Field Day operations.

Scott quickly organized a round-the-clock crew to run net control, message-passing, and logistics. Relays for POC officials, local Alberta Health Services workers, work crews, city and county utilities, and many others were all coordinated through the EOCs established and staffed by volunteer radio amateurs. Relief, movement, shelters, weather, injuries, plus goods such as food, water, and medicine were coordinated through all of the folks who ran the radios and logged the information. Vince said it was “organized chaos” through all of Friday and into the night.

Soon, it was Saturday, and the sun came out and started drying out the roads, even though some of the town was still under feet of water. As it drew closer to noon, one person mentioned that it was almost time for Field Day. The others in the EOC just smiled, and Tammy VA6TSS remarked that she thought they had just finished up with a Field Day of sorts.

You can read this story on the FARS website, in the Alberta *Global News*, and even Wikipedia.

New Hams and Upgrades

New hams

KJ7ZYX = Scierra Clegg
KJ7ZZB = James Littlefield
KJ7ZZE = Danny Peterson
KK7ACR = Craig Ellsworth
W7KLA = Jim Cooper
KK7AIJ = Nicholas Hoffman
KK7AJK = David Trinnaman
K7TDX = Lary Cullimore
KK7AJM = Jaime Rodriguez
KK7AJN = Cathy Starr
KK7AON = Dan Auga
KK7AOO = Lori Bonner
KK7ARO = Martin Eldredge
KK7ARX = Ralph Spencer
KK7ASG = Charles Smoot
KK7AUG = Anthony Rowley
KK7AXV = Sam Gustafson
KK7AXW = Richard Hauley
KK7AXX = Carol Houghton
KK7AXY = Paul Houghton
KK7AXZ = Richard Lyman
KK7AYA = Scott Nielsen
KK7AYF = Jennifer Tupuola
KK7AYH = Laurel Wendt
KK7AYI = Dylan Wolfe
KK7BAV = Geoffrey Howe
KK7BBD = Casey George
KK7BBF = Paul McIlrath
KK7BBG = Danielle McLaughlin
KK7BBH = Genevieve Miner
KK7BBI = Janice Petersen
KK7BBJ = Winston Petersen
KK7BBK = Eric Shimada
KK7BBL = Brenden Stender
KK7BBM = Gregory Stone
KK7BBN = James Tuck
KK7BBO = Madison Tuck
KK7BBP = Stephen Wing

Upgraded hams

N7GPG = Keith Driskill (Extra)
KN4MJE = Marc Ellison (Extra)
KJ7WVU = Steven Ryant (Extra)
KG7FXG = Gary Beach (Extra)
KK7AON = Dan Auga (General)
KJ7HLQ = Henry VonClegg (Extra)
KJ7QYQ = Susan Carey (General)
W7KLA = Jim Cooper (General)
KJ7ZLB = Dakota Gardner (Extra)
N7ATX = Phillip Catherall (Extra)

Congratulations to all these diligent folks! We look forward to hearing you on the radio soon.

Events

Upcoming happenings

UVARC Christmas Potluck

Last year we weren't able to hold our annual UVARC Christmas Potluck because of the you-know-what. Well, this year we're returning with a vengeance. Assuming the Pandemic doesn't throw us out of our location again, we hereby announce that ***the potluck is on!*** Set aside the night of Thursday December 2nd from 6:00 pm, for the biggest potluck of the year, at the Orem Senior Friendship Center, 93 N 400 E. We'll announce a sign-up sheet later.

Santa said he's planning to be there to sample our goodies, so bring your little ones, to get photographed with Jolly Ol' St. Nick himself. Seconds for those who get their photo taken on his lap.

We'll also have tables set up in back for you to show off your latest projects. More details later.

FCC fees postponed to 2022

You might be aware that, over a year ago, the FCC had announced that they'll start charging fees for amateur radio licenses, upgrades, vanity call signs, and renewals, but that no date had been set. They still haven't announced a date to implement the new $35 fees, but they've now stated in a letter that the new fees will not go into effect until 2022 at the earliest.

To be clear, the fees that exam candidates now pay for exams at the sessions will not change, because they don't involve the FCC. But after the exam session, the FCC will send the passing candidates a link where they can pay the new fee before the license or upgrade can be issued.

76ers Santa Net

The 76ers Santa Net tradition continues! But on a slightly different day this year. The revered and long-anticipated net will take place on Wednesday December 22 and Thursday December 23, at 6:00 pm on the 146.760 MHz repeater. Open to anybody, young or small, who wants to talk with Santa, but there must be at least one person at your station who is licensed.

To participate, simply bring your little ones to the radio, have them announce your call sign into the microphone when Santa asks for them, and when Santa calls for them, they can talk away at will. When they're done, they can say Thanks, give your call sign, and turn it back to Santa. No need for you to say anything, or intervene in any way, unless they're too young to do or say some of that.

The Ugly Antenna Contest

Yes, we're still planning to hold our first-ever Ugly Antenna Contest. Anybody can enter an antenna into the contest, but the owner must demonstrate that it can transmit farther than a city block on an amateur frequency. We'll have three judges who'll decide which working antenna is the ugliest. The top three will win prizes, but first place wins a used HF radio.

But we're going to need a place for it, so until we can secure one, unlike your ugly antenna, the date is still up in the air. We're getting closer, so stay tuned!

Brass Tacks

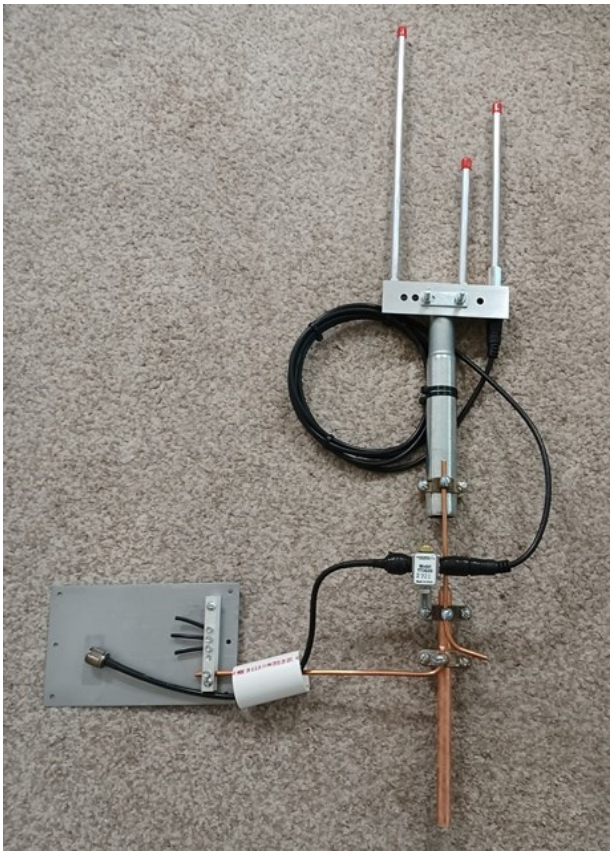
An in-depth look at a radio-related topic

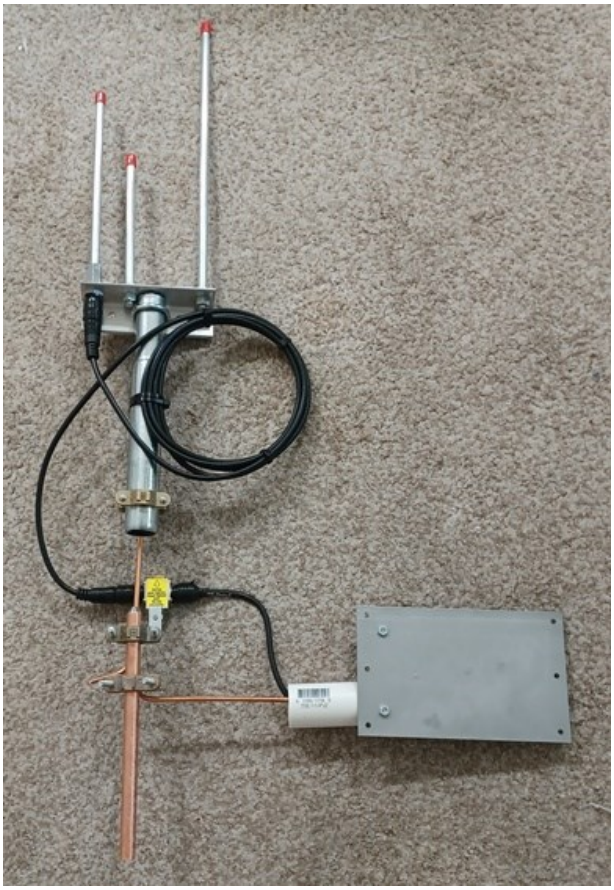
Proper grounding, in a nutshell

In past club meeting presentations, newsletter articles, and elsewhere, we've discussed grounding: what to ground, how to ground, and the reason for grounding. And yet, it occurs to me that one reason questions keep arising is the lack of a tangent, big-picture grounding demonstration. I decided to try and fill that void by creating just that, a somewhat complete, portable grounding visual aid.

On your roof

If your rooftop antenna is installed on a mast , like the open-stub J-pole pictured here, your mast will need to be grounded, according to the NEC (National Electric Code). You





can ground your mast by connecting a heavy (6 AWG minimum) ground wire between your mast and your ground rod, using grounding clamps on both. If your mast isn't connected to your antenna base, you should connect the ground wire to both the mast and the antenna base.

The ground below

As directly below your antenna mast as possible, you need to drive an eight-foot ground rod into the dirt, and attach your ground wire to it. You might find that your yard contains more rock than dirt, preventing you from dri-

Brass Tacks

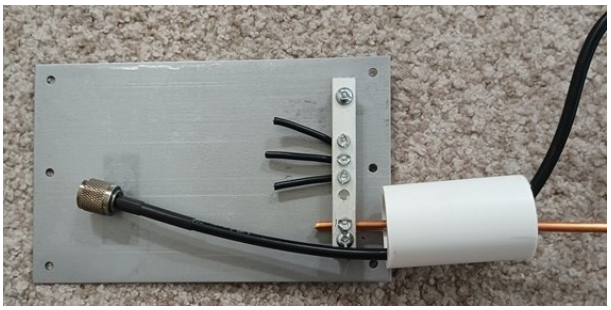
continued

ving your rod all the way in. In that case, you can either drive your rod in at an angle, or simply cut your rod short after you've driven it down as much as you could.

Locate your *electrical service*, or the place where your electrical power enters your home. Drive one ground rod for every 16 feet between your antenna ground rod and your electrical service, then ***bond*** them all to your service by attaching grounding wires between all of them and your service. All your ground rods and connecting grounding wires should be buried in the dirt.

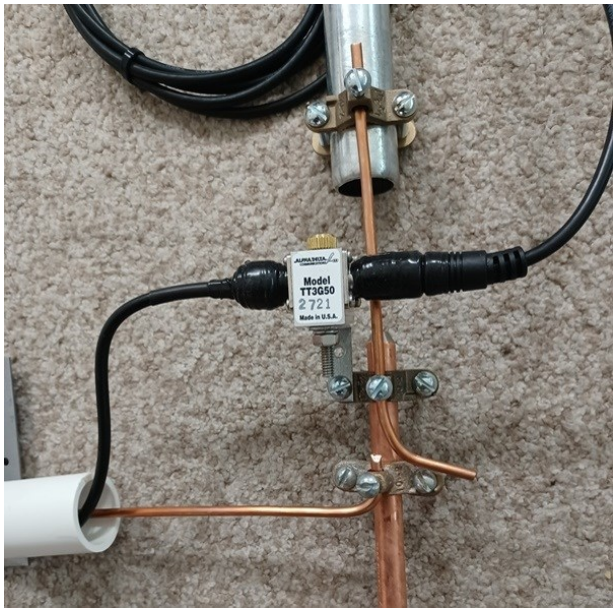
In your shack

The short piece of PVC on the model represents your house wall, where your coax and ground can enter. You should get hold of a thick sheet of steel or copper and mount it on your shack wall or desk. This is known as your *ground panel* or *ground plate*. Then, install a grounding bus bar to the plate. Attach a thick grounding wire between your ground rod outside and your grounding bus bar.



All your AC-powered shack equipment can be grounded to this single plate, which will provide the safety ground and yet prevent ground loops, caused by daisy-chaining equipment grounds. Each of the little, black wires protruding from the grounding bus bar in the model represent each wire that connects to your power supply, amplifier, and other AC-powered shack equipment.

If you live on the second floor, or find it otherwise impossible to connect your outdoor ground wire to your shack ground plate, simply connect the plate to the ground pin of your nearest room outlet instead.



On the ground rod nearest your shack, install a ***surge suppressor*** (or *lightning arrester* or *antenna discharge unit*, depending where you read it) onto your ground rod. On my own house, I use one that has SO-239 connectors for the coax connections and a stud for the ground connection.

Routing of your coax

Once you connect your coax to your antenna, form an RF choke by coiling your coax in six turns of six-inches in diameter *if your coax is RG-8X*. Tie the loops together and to your mast with UV-proof zip ties. Connect the other end to one side of your surge suppressor. Connect a length of coax from the other side of your suppressor, through your house wall, and into your shack. It doesn't matter that you run your coax alongside your ground wire anywhere along their paths; they'll neither help nor interfere with each other.

Brass Tacks

continued

Although my little model uses RG-8X, I actually recommend LMR-400 if your coax is longer than, say, 50 feet.

Just outside your house entrance, I highly recommend forming a drip loop for your coax, one thing missing from my little model.

Finally, wrap all exposed coax connectors with silicone tape, such as Stretch-and-Seal, and avoid using electrical tape, except only for temporary uses. Once applied, silicone tape should keep out moisture, prevent UV damage, and is easy to remove, if needed.

Will it work?

I'm hoping that I can use this little demo to show people how their entire grounding solutions should appear on a miniature scale, if they're done properly. Obviously, each grounding configuration will have to be tailored for each individual rooftop application, but I believe this model should answer many questions regarding proper grounding.

My actual shack ground rod, plus surge suppressors for my VHF and HF antennas. Notice the two 4 AWG bare copper wires going into the ground to the antenna and to my service. The braid is my ground connection to my indoor ground plate.

The short piece of grounding wire in the model tailing off the ground rod, opposite the PVC is merely a suggestion of where your ground wire continues to bond to your next ground rod, and eventually, to your service.

Noji Ratzlaff, KNØJI (kn0ji@arrl.net)

Dear Annette

What's on your mind? Serious, humorous, technical, and thoughtful answers to your deepest, (mostly) ham-related questions.

Dear Annette:

According to an online coax loss calculator, the loss figures people quote for most coax only applies to the matched case; that is, only when the SWR is 1:1. But is it true that coax loss depends on SWR?

Calley in Lehi

Dear Calley:

The claim that coaxial cable loss (attenuation) depends on SWR (and therefore the values on most charts only apply to the *matched* case) can be both true and misleading, depending on how you look at it.

When a signal is transmitted on a length of coax, it encounters a percentage (listed in dB) reduction, or loss, of signal strength due to the nature of the coax type. It's this loss figure that's reported by coax charts. Furthermore, if the signal makes the same trip multiple times, it encounters the same percentage loss each trip, adding up to the total loss for all the trips. When a coaxial feed line terminates at an antenna that's perfectly matched (50 ohms) to the coax, the signal makes the trip only once, and so encounters the loss incurred by the one trip. But when the antenna is not perfectly matched, meaning the SWR is greater than 1.0:1, then a portion of the signal will be reflected back to its source, incurring a little more loss with each trip.

So, does feed line loss depend on SWR? When a static loss measurement is made, no, because the load (antenna) is not part of the measurement. But when an actual signal is applied, then the load must also be taken into account, and that load determines the SWR, which can affect the total loss.

Dear Annette:

I've been a member of various ham radio clubs where I've lived throughout the US, and I've never seen so much female participation as I've seen with UVARC. Why is that?

Don in Provo

Dear Don:

If you're asking why UVARC seems to have more female participants, it occurs to me that the UVARC membership goes out of their way to encourage women, without looking down their noses at us. We're the only Utah club that holds a regular net just for us ladies, where we can get on the air and add our personalities freely, without men hovering over our RF shoulders. I believe the fact that our club presidency has women serving on it, adds to the feeling. Finally, I'd like to think that I had a little to do with it too! ;-)

Dear Annette:

Why is it that many mobile radios, and HF radios that do VHF and UHF, transmit on lower maximum power on UHF than on VHF?

Jason in Eagle Mountain

Dear Jason:

At the heart of each transceiver output is a power amplifier that's typically driven by a MOSFET (metal-oxide-semiconductor field-effect transistor.) One characteristic of a MOSFET is that its losses (in the form of heat) increase with frequency. At some point, the losses become so great that the unit is drawing a lot of power for very little output, making it a more effective space heater than a radio. Some manufacturers have overcome this by adding a separate UHF final amplifier, but the added overhead of this luxury often drives the unit cost higher than the market price point.

Got a question for Dear Annette*? Email it to* ***uvarcshack@gmail.com*** *and include your town name. Sorry, no guarantees.*

The Amateur in You, Part 1

What have you been pondering?

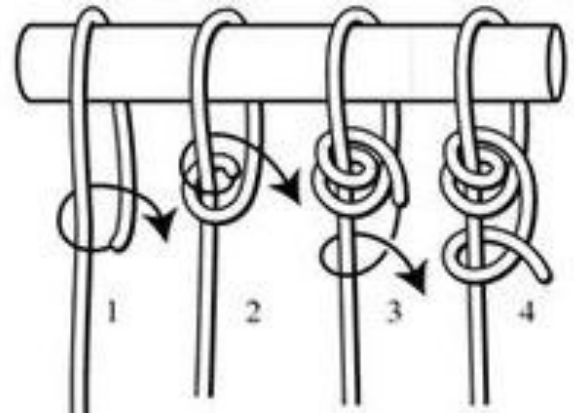
Field Day knots

Whether it's for Field Day, a Special Event Station, or some other antenna setup, there always seems to be a need to quickly tie a temporary but secure knot. But many of us have never been involved with Scouts at all, let alone have cracked the Scout Handbook recently, so remembering your knots might be difficult, with little to draw upon.

Yes, I'm a Scouter, and I have been for a long time, and I remember many of my knots because I have to constantly teach them. Here are a few that I tend to use on tarps, flags, antennas, and other equipment, especially because they're workable for rope, paracord, twine, string, and even linen.

Taut-line hitch

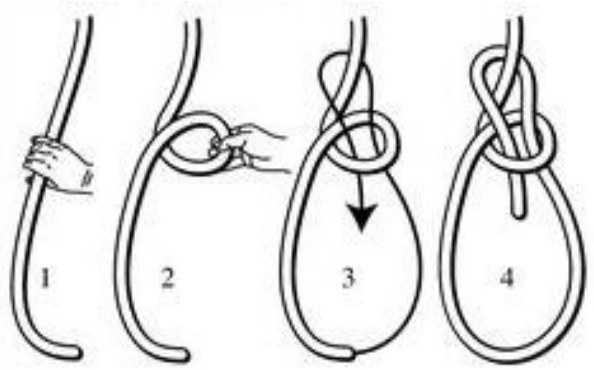
When I need to secure a rope tightly to a fixture, I use a taut-line hitch, which is a slip-on-demand knot, meaning it can slip when I need it to, but remain in place when I don't.



You can see me use a taut-line hitch on most of my antenna paracord that's just long enough to reach the stake, and a little more. This allows me to manipulate the end of the rope through the several loops required by this knot.

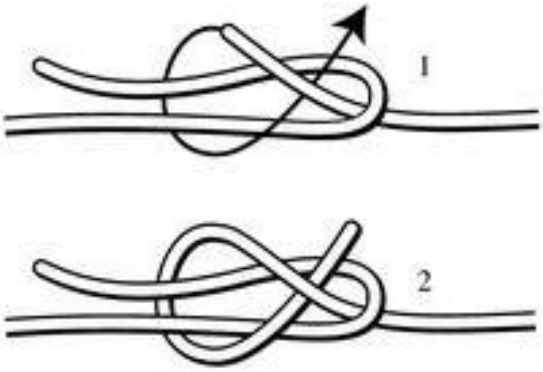
Bowline

The bowline is a strong, no-slip knot. I use it to attach something to a tree, and I don't want the knot to get lost deep near the trunk. I also use it to carry people if I need to, because it won't pinch the person.



Sheet bend

I use a sheet bend when I need to tie together two different ropes, especially if they're different thicknesses. Many times I've had to improvise a rope extension by connecting it to an old extension cord, a large truck rope, or even a scarf, and a sheet bend was just the solution for those times.



The Amateur in You, Part 1

What have you been pondering?

Double two half-hitches

When I need to secure a rope tightly, I tend to use a taut-line-hitch, as I had mentioned. But if I'm using a 50-foot rope, and I tie one end to my antenna mast, and the other end around a stake 23 feet away, I'll have 27 feet of loose rope that's too inconvenient to thread through each of the three loops of a taut-line hitch, and I don't want to cut it short.

My solution is to tie the rope to itself somewhere in the middle of the tight section, using a loop in the loose section to form a double two half-hitches. I call it "double" because I make it from two ropes instead of one, as follows:

There are other good knots I use, such as the square knot, timber hitch, and sheep shank, but these are the ones I use most when I need to get an antenna up quickly. Do you know of an easy, useful knot that the rest of us can benefit from? We'd love to hear about it!

Noji Ratzlaff, KNØJI (kn0ji@arrl.net)

The Amateur in You, Part 2

What have you been pondering?

Effects of feed line reflections

The field and study of transmission line (feed line, in our case) ***reflections*** is no trivial topic, and I pondered whether I should make this discussion into one more worthy of the *Brass Tacks* column, in which I tend to go a little in-depth with a subject.

But it occurs to me that many who ask questions regarding signal and antenna behavior can benefit from such a discussion, even if they don't have a deep RF (radio frequency) background. So, I'm hoping this explanation will be helpful (understandable, and seen as applicable) to the majority of amateurs.

What is a reflection?

When an electrical signal is sent through a wire from some source, such as a stage microphone, AC light switch, or radio transceiver, the signal eventually reaches its load, such as an audio circuit, a light bulb, or an antenna, respectively. The expectation is that all of the power that's sent down the wire will be absorbed (used) by the audio circuit, light bulb, or antenna. However, some aspects of the loads can prevent the signal power from being *completely* absorbed by the audio circuit, light bulb, or antenna.

So now, what happens to the portion of signal power that's not absorbed and put to good use? ***It's reflected back to the source***. And the percentage of that power returned to the source is a number we can use to calculate SWR, or *standing wave ratio*:

$$SWR = [1 + \sqrt{(P_R/P_F)}] / [1 - \sqrt{(P_R/P_F)}]$$

In which P_F is the signal power ***forward*** (how much was sent) and P_R is the signal power ***reflected*** (the portion that returned).

A second chance

However, it turns out that the small portion of the signal that was reflected back to the source, ***will be reflected again by the source, and sent back to the load*** (antenna), and we call that ***re-reflection***. This re-reflected signal makes its way to the load again, and by the same principles, most of that re-reflected signal is used by the load, while a small portion of that signal is reflected by the load. This entire cycle repeats, until all of the original signal is used by the load.

Say you're using a transceiver to send a 100-watt signal to an antenna system that exhibits an SWR of 1.925:1, meaning it will reflect $[(1.925—1)/(1.925+1)]^2 = 10\%$ of it:

1. Your transceiver sends 100 watts
2. Your antenna uses **90 watts** of it, and sends (reflects) 10 watts back
3. Your transceiver resends the 10 watts
4. Your antenna uses **9 watts** of it (totaling 90 + 9 = **99 watts**), and reflects 1 watt
5. Your transceiver resends the 1 watt
6. Your antenna uses **0.9 watts** of it (totaling 90 + 9 + 0.9 = **99.9 watts**), and reflects 0.1 watts

Can you see where this is going? It's important to you, because it means that the portion of your signal that was reflected ***is not lost power***, but will all be eventually sent out the antenna. The only time any of your signal is actually lost (to heat, for example) is during the trip up an down your coax. This is why charts for common coax publish loss figures. And this is why amateurs in a bygone era never discussed or even cared about SWR, because *they didn't use coax*.

Links for further reading

Those who'd like to (dare to) dig a little deeper into reflections might want to look up the resources that are posted on my website.

Noji Ratzlaff, KNØJI (kn0ji@arrl.net)

Hot Tips

Good info for the new ham, and old stuff to refresh your memory

Use Anderson Powerpole connectors

If you're ever in a hurry, and grab a radio plus the necessary gear, then start setting up, only to discover that your DC power cables have different connector types from each other, or do not mate because of gender mis-match, you're not alone. One way to make your DC power connections just a little simpler is to agree on a single, reliable standard that connects and releases quickly, and installs easily. One standard recommended by both local ARES groups and the ARRL is the ***Anderson Powerpole*** (or *Powerpole* for short), which is very convenient.

What it is

A Powerpole connector is a two-conductor, snap-together pair of shaped metal tabs located in a plastic housing, often color-coded to indicate electrical polarity. They're gender-neutral, meaning that there is no separate plug and socket; each connector is both a plug and a socket that can mate with any other connector. Also, Powerpole connectors are inherently safe because they present no exposed electrical parts that can be contacted by a person or anything near the connector.

For those of use who are hobbyists or experimenters, the Powerpole connector is convenient if you need to repeatedly connect and disconnect your DC power, such as your battery or other power supply, to your radio, or other devices. For the many who are involved with portable radio work, such as emergency communication, field work, or even instructional demonstrations, this convenience can be a real time-saver, knowing that you can count on any of your equipment being able to connect its power requirement to any source, without worrying about connector types.

Installation

You can purchase Powerpole connectors for generally three wire gauges, named for the current-carrying capabilities of the intended wires, the 15-amp, 30-amp, and 45-amp sizes. In spite of their different wire and tab sizes, their housing exteriors are all the same size, and connect with each other. You can also purchase a 75-amp size, but their large housing cannot be connected to the housings of the other three. While you can connect any appropriate wire to a Powerpole connector, it's convenient to use *zip cord*, which is a two-conductor pair of stranded wires for your needed gauge, easily identifiable by their characteristic red-and-black insulation.

When you install an Anderson Powerpole connector pair onto a pair of wires, it's recommended that you *crimp the tab onto the wire, and not solder it*. Once you crimp the tab onto the wire, you can install the housing vertically, with the positive over the negative, or horizontally, with the positive on one side or the other. The current convention is to install them horizontally, with the positive on the left if you look into the connector end, and with the tab cups facing downward. The housings typically come in different colors, and it's recommended that you use red for positive and black for negative.

Where you can get them

You can purchase Anderson Powerpole connectors from Amazon, eBay, or at the source, from Powerwerx.com. Just make sure the conductor size matches the gauge of wire you intend to install them on. And if you don't already have a pair, be sure to purchase the Powerpole connector crimp tool, but beware of ill-fitting imitations by also purchasing them from Powerwerx.

DIY

Worthwhile projects you can build on your own

NVIS antenna for 40 and 80 meters

In a previous issue of *UVARC Shack* (January 2018, p. 15), we featured a pseudo-Yagi NVIS antenna that worked marginally well, but not close enough for government work. This time we're spotlighting an NVIS antenna promoted by DX Engineering and patterned after one that was used by the US Army, the AS-2259/GR. The two unique and immediately apparent features of this version are the inverted-V formation and the cross-element layout.

This design is so simple that it can be described as two perpendicular inverted-V dipoles, each using the other as a capacitance match, relieving the need for a discrete matching device. The coax center conductor connects to one element of both, and the shield to the other two. The transformer-less "balun" (actually nothing more than a center insulator) and feed point are then raised about 16 feet, and you have yourself an NVIS antenna. Let's build it

Parts list

130 feet of 14 AWG stranded wire

Two 1-¼″ PVC slip caps

Five 1-½″ x 3/16″ eye bolts

One SO-239 bulkhead connector

#8 screws, nuts, flat washers, split washers

12″ 14 AWG speaker wire pair

One 1-¼″ 24″ long PVC tube

Eight 14 AWG #8 stud ring terminals

Crimp sleeves (optional)

4 each M3 screws, split washers, nuts

Four dogbone insulators (you can fabricate these from ½″ PVC, about 3″ long each)

Transformer-less "balun" construction

Drill a 3/16″ hole in the center of one of the slip caps, and install an eye bolt through a flat washer on the outside of the cap. Slip another flat washer onto the eye bolt on the inside, followed by a split washer, then tighten a nut onto the eye bolt of the slip cap assembly and set aside.

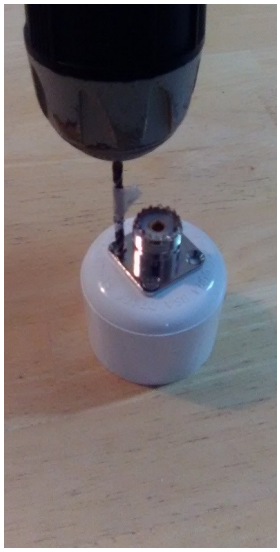
Drill a 7/16″ hole in the center of the other slip cap. If your slip cap is domed (most are), rather than flat, it'll help with the installation to sand the outside of the cap so that the entire flange of the SO239 bulkhead sits flush with the cap. Insert the solder end of the SO-239 bulkhead into the 7/16″ hole on the outside of the cap, and using the mounting holes of the bulkhead as a template, drill a 1/8″ hole for each mounting hole. Drill two more 1/8″ holes in the slip cap next to the SO-239 bulkhead flange, to allow for drainage of rain water that might collect inside the balun.

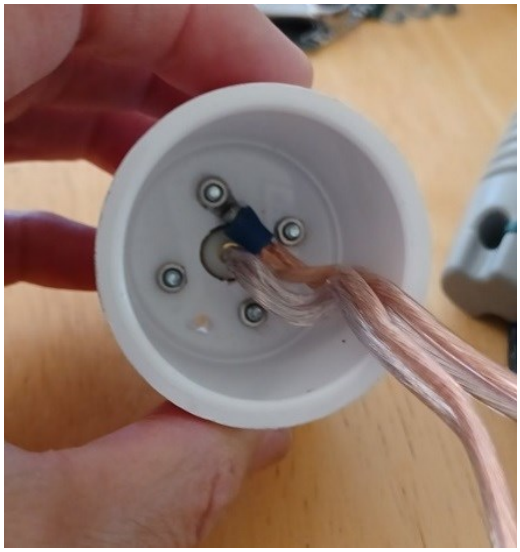
Cut the speaker wire into two 6-inch pairs. Strip both sides of each end of both 6″ speaker wire pairs. For each pair, solder a #8 ring terminal to each conductor of one end, and a #4 ring terminal to one of the conductors of the other end. Slip a piece of heat

DIY, continued

NVIS antenna for 40 and 80 meters

shrink tubing over the remaining conductors, then solder them to the center pin of the SO-239 bulkhead, and shrink the tubing. Use the metric screws, washers, and nuts to bolt the SO-239 bulkhead to the slip cap, including the #4 ring terminal to one of the screws inside of the cap.





Cut a 3-½″ section off of the 24″ PVC tube. Drill a 3/16″ hole in the side of the PVC tube 1-½″ from one end, which I'll refer to as the top end. Drill another 3/16″ hole just ½″ below the top hole, placing it 1-½″ from the bottom end. Slip an eye bolt through a flat washer into the top hole, and tighten a washer and nut to it on the inside. Screw a nut onto a 1″ #8 screw, and slip the pair through one of the #8 ring terminals of the speaker wire, then through the bottom hole from the inside. Tighten a nut and washer onto the screw assembly from the outside. Repeat these two on the three other sides, 90 degrees apart from each other. Place the two assembled caps onto the tube, and the balun is complete. Once you make sure the connections are electrically continuous, you're free to glue the caps on.

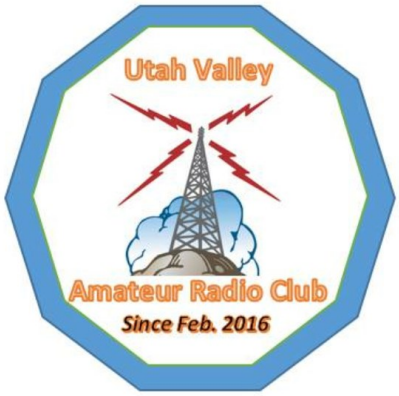
DIY, continued

NVIS antenna for 40 and 80 meters

Element construction

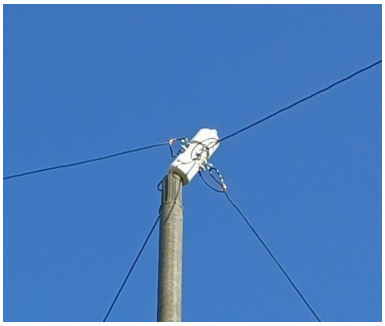
Cut two 14 AWG wires 27 feet long for the 40-meter elements, and two more 40 feet long for the 80-meter elements, making each two feet longer than they need to be, for strain-relief. Thread each element wire through a crimp sleeve (or other strain-relief device), through one of the balun eye bolts, then back through the crimp sleeve. Solder a #8 ring terminal to the end of the wire exiting the crimp sleeve, fasten the ring terminal to the balun with a nut, then crimp the sleeve. Thread the other end of the element wire through another crimp sleeve, through a dogbone insulator, then back through the crimp sleeve.

For the 40-meter elements, measure 25 feet 0 inches between the balun eye bolt and the dog-bone insulator, then crimp the sleeve. For the 80-meter elements, measure 38 feet 0 inches between the balun eye bolt and the dogbone insulator, then crimp the sleeve. Repeat this with all the elements, mounting the two 40-meter elements opposite each other and 80-meter elements opposite each other.



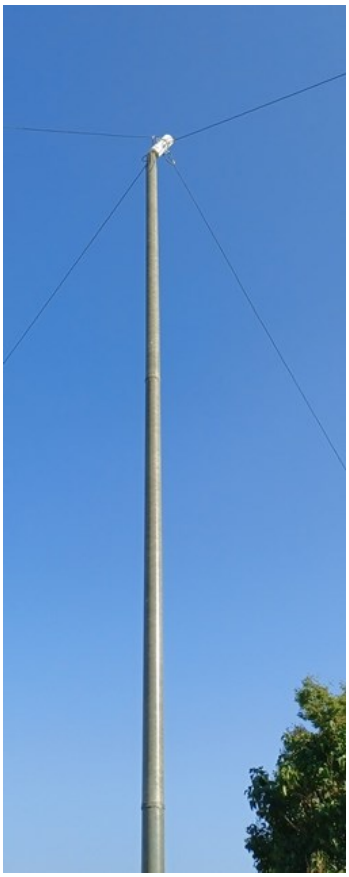
DIY, continued

NVIS antenna for 40 and 80 meters

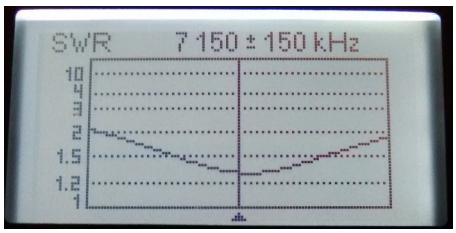


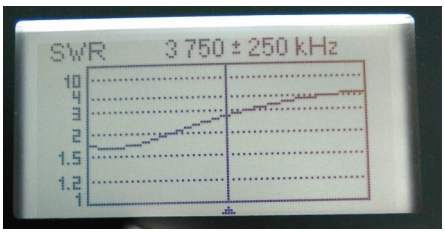
Test time

With all the element wires laid out from the balun, I connected the coax to the SO-239 bulkhead connector, then raised the balun onto a stack of four 4-foot fiberglass military poles. For convenience, I ran the coax down through the poles, and drilled a ¾″ hole in the side of the bottom pole, about ten inches from the very bottom, for the coax to exit. I then tied paracord between each of the dogbone insulators and a light tent stake, about 20 feet for the 40-meter element wires and 7 feet for the 80-meter element wires. This forms each side into a 45-foot-long slope, making the entire footprint a square of about $\sqrt{(45^2 - 16^2)} \times \sqrt{2} \approx 60$ feet per side.



Because my transceiver needed to sit outside the perimeter of the antenna, to prevent unwanted coupling and interference, I had to use coax that was at least 60 feet long, so I used a 75-foot-long length of RG-8X I had purchased from Amazon from a couple of years back, and it came with molded PL-259 connectors. I wasn't too worried about the loss, since the attenuation of RG-8X at 40 meters is around 1.0 dB per 100 feet, making (1.0 dB x 0.75 =) –0.75 dB, or about 16%, which is hardly noticeable, and even less loss at 80 meters.





In the end

This military-based design of an NVIS antenna seems to both measure better and work better than the one previously published in the newsletter. The SWR across 80 meters was far from perfect, but my tuner easily brought that within workable range.

Noji Ratzlaff, KNØJI (kn0ji@arrl.net)

Living in the Past

Historical perspective

The first wireless transmission

It's well-established that Guglielmo Marconi was the first to make a local wireless transmission to his mother in 1894, and then the much-publicized transatlantic transmission in 1901. Later, the distinction of the very first radio patent was actually awarded by the US Supreme Court to Nikola Tesla, who in 1893 wirelessly powered the Chicago World's Fair, then in 1898 demonstrated the first wirelessly controlled craft. Yet way back in 1866, before Marconi was even born, an obscure dentist named Mahlon Loomis had actually demonstrated a successful wireless transmission and reception between stations located 18 miles apart.

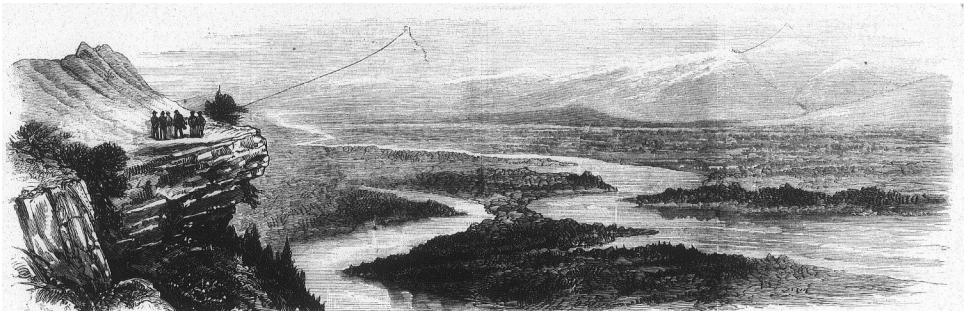
Who?

On two separate mountain peaks of the Blue Ridge Mountains, nearly identical setups using thin wires, kites covered in conductive mesh, and no power source except the Earth's atmosphere, Loomis set out to prove his theory. He surmised that the Earth's atmosphere contained enough electrified energy to power his stations, allowing one to send communication pulses to the other.

Each kite and conducting "kite string" was flown to nearly 600 feet in the air, with the end of the conducting string tied to earth ground. The wire of one of the kites was interrupted near the ground by a make-shift key (unwitting fore-runner of the later spark gap), while the wire of the other was interrupted by a galvanometer, to measure the reception response.

At a precise predetermined time, one station keyed a sequence of pulses, while the other station recorded the galvanic response. They repeated this several times, to ensure they had recorded accurately, and remove random noise from the result. The results were as Loomis had predicted, and had become the first known wireless communication.

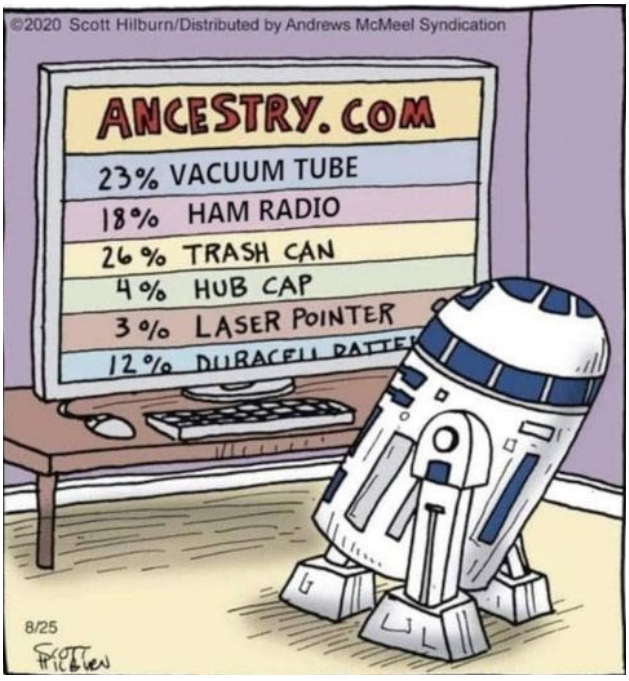
Due to lack of funding (in part because of the Chicago Fire), and in spite of an 1873 patent, Loomis was never able to produce his invention. Some also believed Loomis might have been a bit ahead of his time with this new wire-free communication marvel. His name fell to anonymity, and his discovery never found its way into radio textbooks, allowing bigger names to draw the limelight.



Side of Bacon

A little ham humor

"My husband stumbled into the cables behind his radios last month and I haven't seen him since!"
MISSING PERSONS
Facebook.com/FreeRangeComic



I'M SO PROUD OF MY VICTORY GARDEN!
OH, MARIGOLD··· HAVE YOU PLANTED A VICTORY GARDEN?
I SURE HAVE!
THAT'S A REAL VICTORY GARDEN!
APR-22
ERNIE BUSHMILLER

For Your Insight

Information you could use

Club meeting format

Here's the usual agenda for club meetings, at the Orem City Council Chamber Room, 56 N State St:

Talk-in frequency on the club repeaters

6:30 pm : Eyeball QSO

socialize / put faces with call signs

radio programmers available to help you

6:45 pm : Call the meeting to order

meeting lineup (agenda)

announcements / nets / awards / calendar

7:00 pm : Discussion / breakout session

discussions typically involve everybody

breakouts split into separate groups

7:45 pm : Door prizes

7:55 pm : Dismiss and disassemble

8:00 pm : *Club QSY* to a local eatery

Something you'd like to see at the meetings?

Monthly meeting help

We're grateful for the volunteers who help with various tasks that make our club night just that much more friendly and useful to everybody. Monthly, we need help with

programming radios (thanks, Loren / Ralph / Mickey!)

taking photos or videos during the meeting

operating the talk-in radio

setting up tables and chairs (thanks, Heath!)

Lynx

Websites for your education and leisure

Training items and topics for nets

Ham Radio Nets

Radio programming

76ers Group and UVARC Group pages

Utah Ham Radio Exam Schedule

Send your input to ***uvarcshack@gmail.com***

Questions of the Month

Test your knowledge (answers next page)

G1CØ1 : What is the maximum transmitting power an amateur station may use on 10.140 MHz?

A. 200 watts PEP output
B. 1000 watts PEP output
C. 1500 watts PEP output
D. 2000 watts PEP output

E7BØ2 : What is a Class D amplifier?

A. A type of amplifier that uses switching technology to achieve high efficiency
B. A low power amplifier that uses a differential amplifier for improved linearity
C. An amplifier that uses drift-mode FETs for high efficiency
D. A frequency doubling amplifier

Calendar

What's happening
(times are Mountain Time)

Utah County Ham Exam Sessions

BYU J. Reuben Clark Law School building

Sign up at HamStudy.org/sessions

Sat Oct 16, 2:30 to 5:00 pm
Wed Oct 20, 7:00 to 8:30 pm
Wed Nov 17, 7:00 to 8:30 pm
Sat Nov 20, 2:30 to 5:00 pm
Wed Dec 15, 7:00 to 8:30 pm
Sat Dec 18, 2:30 to 5:00 pm

Provo One-day Technician Courses*

Third Saturday Monthly at 8:00 am
BYU Law School Bldg, First Floor
* *September through April*

2022 Orem Ham Radio Courses

Sign up at psclass.orem.org

Technician : Tue Jan 18, 25, Feb 1, 8
General : Tue Mar 22, 29, Apr 5, 12
Technician : Tue May 17, 24, 30, Jun 7
Extra : Tue Jul 12, 19, 26, Aug 2, 9
Technician : Tue Sep 20, 27, Oct 4, 11

Club Meeting Calendar (6:30 pm)

On YouTube Live, and Facebook Live

October 7	November 4
December 2*	January 6
February 3	March 3
April 7	May 5

* *Potluck at the Orem Friendship Center*

Regular Nets

UVARC Ladies' Net, Tue 7 pm, 146.780
DMR Utah Net, Wed 6 pm, TG 3149, CC 1
Utah 76'ers, Wed 7 pm, 146.760
Sultans of Simplex, Wed 8 pm, 446.325
UVARC HF Net, Wed 9 pm, 28.345 / 7.220
UVARC New Ham Net, Thu 7 pm, 146.780
CERT Ham Net, 2nd, 4th Thu 8:pm, 146.780
UVARC 2-meter SSB Net, Thu 9 pm, 144.234
Utah County 6 meters, Fri 8 pm, 50.140
Family History Net, Sat 8 pm, 146.780
UVARC Family Net, Sun 3:30 pm, 146.780
See a larger list of nets at noji.com/nets

Upcoming Contests

California QSO Party
10 am to 4 pm Sat Oct 2

CQ Worldwide DX Contest
6 pm Fri Oct 29 to 6 pm Sun Oct 31

Japan International DX Contest
Midnight Sat Nov 13 to 6 am Sun Nov 14

ARRL Sweepstakes, SSB
2 pm Sat Nov 20 to 8 pm Sun Nov 21

See a larger list at contestcalendar.com

Answers to the Questions of the Month

G1CØ1 : **A** (200 watts PEP output) [see Part 97.313(c)(1)]

E7BØ2 : **A** (A type of amplifier that uses switching technology to achieve high efficiency)

Vendors

For your convenience

Pockrus Joystick J-pole

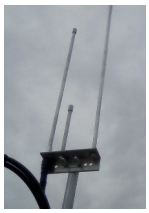
$25, open-stub aluminum half-wave, dual-band J-pole antenna

$35, 6-meter dipole, $20 for the 220 MHz (1.25 m) antenna

by Carl Pockrus, WE7OMG (email omgantennas@gmail.com to order)

Half-wave performance, solid construction, weather-proof, low wind-load

Probably the best-performing outdoor antenna you can get for the price



Super-Elastic Signal Stick

$20, vertical quarter-wave flexible antenna

by Richard Bateman, KD7BBC, of *SignalStuff* (and maker of *HamStudy*)

Super-performing antenna for your HT (handhold transceiver)

Visit SignalStuff and select SMA-Male, SMA-Female, or BNC

Ham Radio Podcasts v1.50

by Trevor Holyoak, AG7GX (email android@holyoak.com)

Stream podcasts (such as *100 Watts and a Wire*, *Amateur Radio Newsline*, *ARRL Audio News*, etc.) or download for later listening

For Android 4.1 and up (ad-free available for purchase)

Club Logo and Call Sign Embroidering

Want your call sign or name (or both!) embroidered on your shirt, your hoodie, your duffle? Or how about a club patch with your call sign?

by Glenna Gardner, WE7SEW (glenna0354@gmail.com or text 801-592-2503)

Call sign or name = $5, Both = $8, UVARC patch = $5, Patch with call = $9

Portable Aluminum J-pole

$49, sectioned, open-stub aluminum half-wave, dual-band J-pole antenna

by Stan, KJ7BDV and Kent, N7EKF (email skantenna@yahoo.com for info or call 801-372-7260)

Complete antenna breaks down into a compact 2″ x 6″ x 12″ package weighing only 3 lbs, perfect for backpacking and portable work where you really need a good 2-meter antenna

HamBadgers

Amateur radio name badges and other products

$10, official UVARC ham radio name badge with the club logo

Visit Ham Badgers and select Ham Radio Clubs > Utah Valley Amateur Radio Club

Email Eric Palmatier at hambadgers@gmail.com or call 919-249-8704

Where everybody knows your call sign

Utah Valley Amateur Radio Club
PO Box 1288

K7UVA
Phone/Text: 801-38-1865
Email: k7uva@arrl.net

Repeaters: 146.780–, 100.0
448.200–, 100.0 224.560–, 100.0
145.250-, 100.0 448.225-, 100.0
Newsletter input?
Email uvarcshack@gmail.com
Need help?
Email uvarcelmer@gmail.com

[See all our newsletters on uvarc.club]

We are the *Utah Valley Amateur Radio Club*, a 501(c)(3) non-profit (EIN 81-360-6416) Utah corporation that was organized in an obscure Orem fire station on 02-05-2016 to provide amateur radio enthusiasts in Utah County and surrounding areas a way to gather and discuss all things ham. Our primary purposes are to provide a local amateur radio resource, help new hams in their new-found adventures, and to give more experienced hams a reason to share their wealth of knowledge and wisdom in a friendly atmosphere of fellowship. We're an ARRL Affiliate and work in cooperation with the Utah VHF Society, but are not subsidiary to them, to ARRL, ARES, or any other organization, although many of our members and leaders might also belong to the same.

This newsletter is copyrighted and published by the Utah Valley Amateur Radio Club, and its purpose is to convey the tone and temperament of the club, to inform and entertain its members, and to entice the rest. To join, go to uvarc.club/join, then sign up at www.facebook.com/groups/uvarc/ to stay informed. For more information about our club or about amateur (ham) radio in general, please email or text or call us.

More than just a club, we invite you to become part of a great ham radio movement in Utah Valley

Our fearless leadership

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Loren Chandler, WB1KE
James Brown, W7JHB
Harry English, AA1HE

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Heath Stevenson
Orem City Emergency Manager

From all of us to you, 73